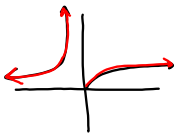
33. $y = \sqrt{\frac{x}{x+1}}$

f is continuous really means f is continuous on its domain.

f is not continuous at $x = -1$

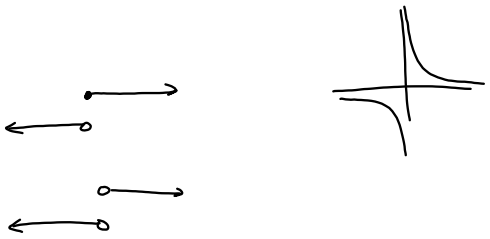
never the less f is continuous (on its domain)



domain $(-\infty, -1) \cup [0, \infty)$

Is $f(x)$ continuous on $(-\infty, \infty)$? No

Aug 30-8:53 AM



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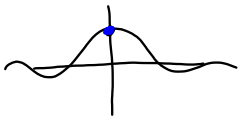
27. $f(x) = \frac{\sin x}{x}$



$\lim_{x \to 0} \frac{\sin x}{x} = 1$

$$g(x) = \begin{cases} \frac{\sin x}{x} & x \neq 0 \\ k, & x = 0 \end{cases}$$

$k = 1$

Aug 30-9:29 AM

Review ch 2

lines:

pt-slope $y = m(x - x_1) + y_1$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

if $l_1 \| l_2$ then $m_1 = m_2$

if $l_1 \perp l_2$ then $m_1 = -\frac{1}{m_2}$

normal

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Rates of Change

average rate of change = $\frac{f(b)-f(a)}{b-a}$

t (s)	0	4	8	12
pos (ft)	0	16	48	128

estimate the inst. rate at 6 seconds

S.D.Q. $\frac{48-16}{8-4}=8$ $\frac{ft}{sec}$

rock $y=16t^2$ ave vel for first 4 seconds

$\frac{16\cdot4^2-16\cdot0^2}{4-0} = \frac{256}{4} = 64$ ft/sec

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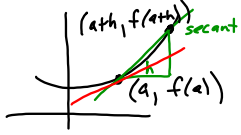
instantaneous rate (slope of tan line) at $x=a$



$\lim_{h\to0} \frac{f(a+h)-f(a)}{h}$

rock: $y=16t^2$ inst. velocity at $t=1$ $(a=1)$

$\lim_{h\to0} \frac{16(1+h)^2-16}{h}$

$\lim_{h\to0} \frac{16(1+2h+h^2)-16}{h} = \lim_{h\to0} \frac{16+32h+16h^2-16}{h}$

$\lim_{h\to0} \frac{h(32+16h)}{h} = 32$

Aug 30-9:49 AM

limits

sometimes you can just plug in

can't plug in? simplify then plug in

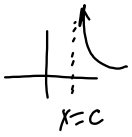
Aug 30-10:02 AM

limits at infinity

8 $\lim_{x\to\infty} f(x)=L$ then HA at $y=L$

Infinite limits

$\lim_{x\to c} f(x)=\infty$ VA at $x=c$



Aug 30-10:03 AM

Continuity

$f(x)$ is continuous at $x=c$

1. $\lim_{x \to c} f(x)$ exists (2 sided limit)
2. $f(c)$ exists
3. #1 = #2

$\lim_{x \to c} f(x) = f(c)$

Aug 30-10:06 AM